

# **Item 6D**

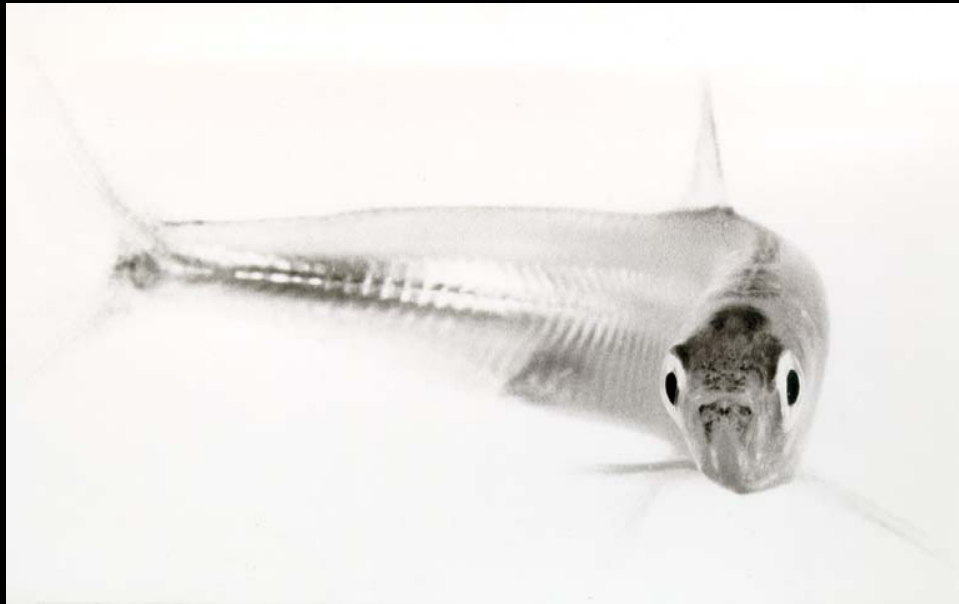
## **Interagency Ecological Program (IEP) Pelagic Organism Decline (POD) Update**

### ***Information Item***

**California Bay-Delta Authority**

**June 15, 2006**

# POD Update



***Chuck Armor***

***Interagency Ecological Program***

# Pelagic Organism Decline (“POD”) Management Team

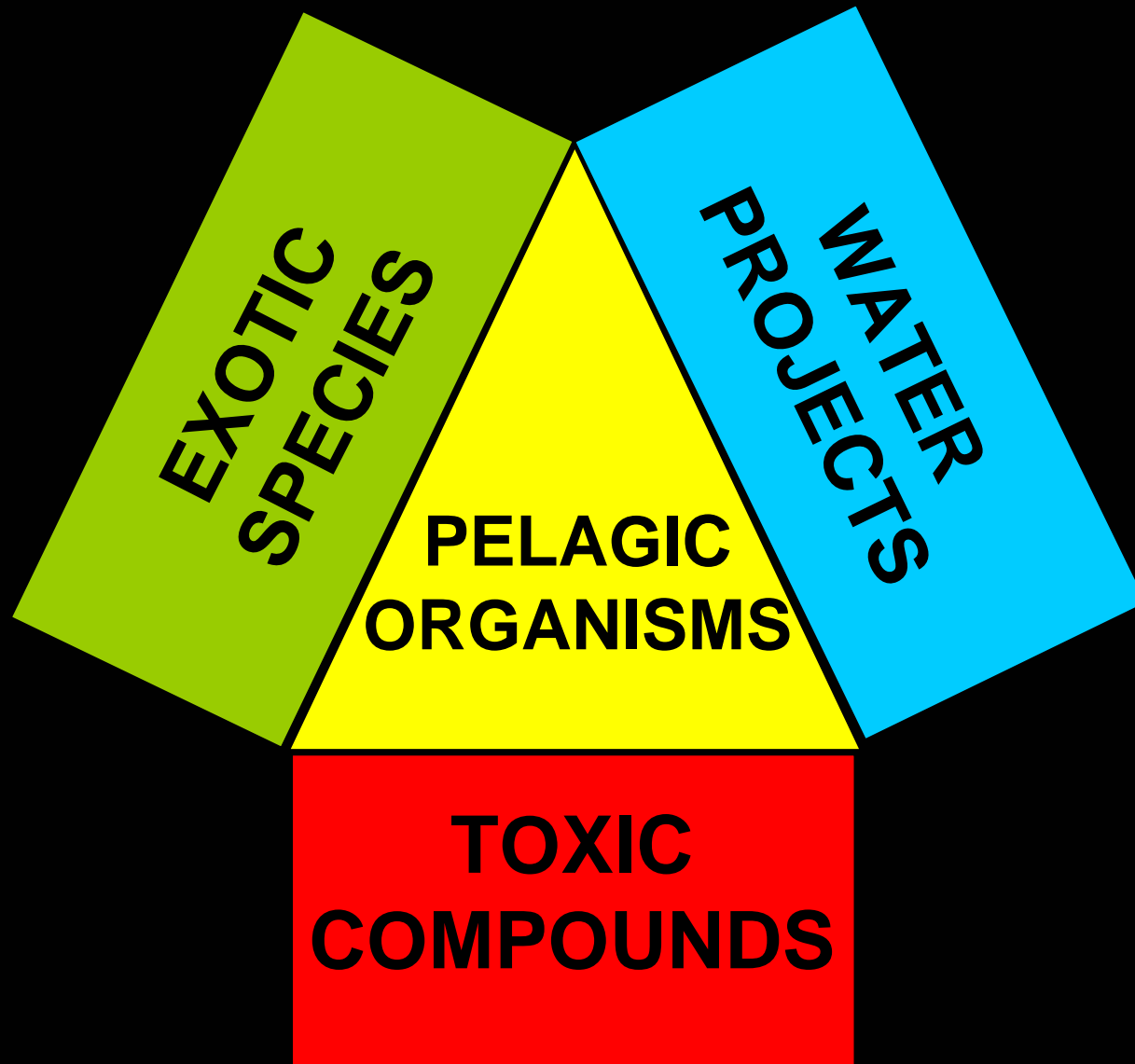
- **DFG**
  - Chuck Armor, Randy Baxter, Marty Gingras
- **DWR**
  - Matt Nobriga, Rich Breuer, Anke Mueller-Solger, Ted Sommer
- **CBDA**
  - Steve Culberson
- **USBR**
  - Mike Chotkowski
- **USEPA**
  - Bruce Herbold
- **NMFS**
  - Jeff McLain

# POD Principal Investigators

- Dept Fish and Game
  - Randy Baxter, Marade Bryant, Kelly Souza, Steve Slater, Lee Mecum, Russ Gartz, Kathy Hieb, Marty Gingras
- Dept Water Resources
  - Matt Nobriga, Fred Feyrer, Ted Sommer, Bob Suits, Marc Vaysierres, Heather Peterson, Zoltan Matica, Peggy Lehman, Lenny Grimaldo
- US Bureau of Reclamation
  - Mike Chotkowski
- USEPA
  - Bruce Herbold
- US Geological Survey
  - Joe Simi, Cathy Ruhl
- UC Davis
  - Bill Bennett, Swee Teh, Inge Werner, Dave Ostrach
- SF State University
  - Wim Kimmerer
- SF Estuary Institute
  - Daniel Oros, Geoff Siemering, Jennifer Hayworth
- Consultant
  - Bryan Manly

# **FACTORS IN THE PELAGIC ORGANISM DECLINE**

## **2005 RESULTS**

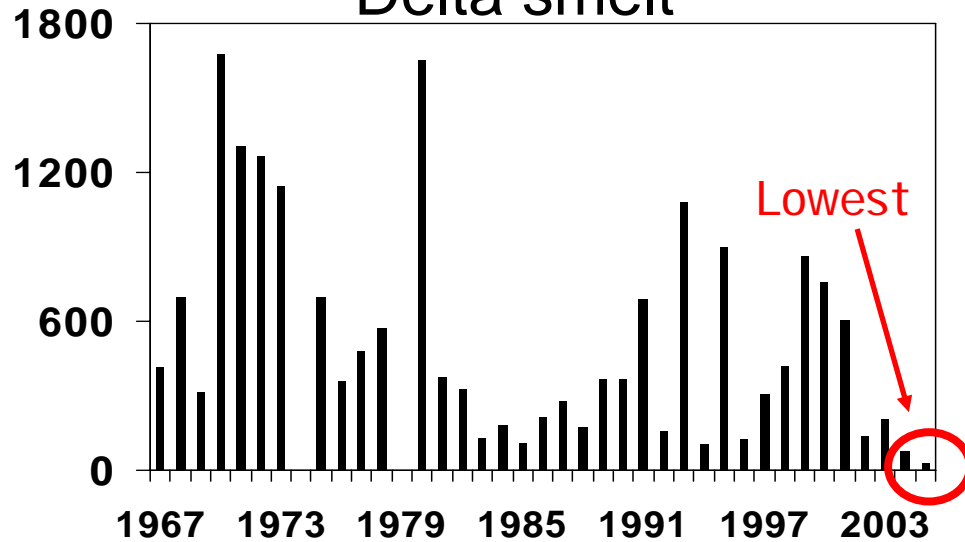


# 2005 Abundance Results

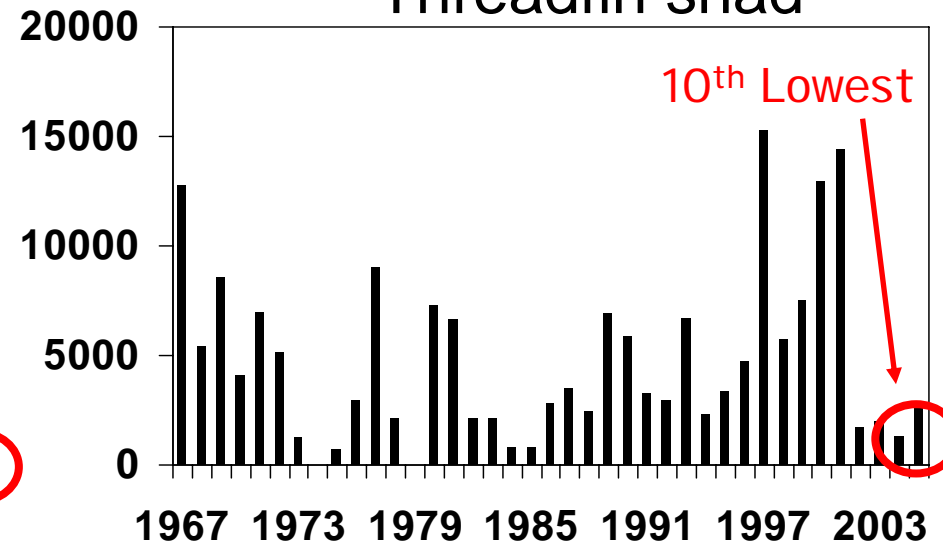
- Hypothesis: Improved Hydrology in 2005 would have no major effect on the decline.

# 2005 Fall Abundance Indices

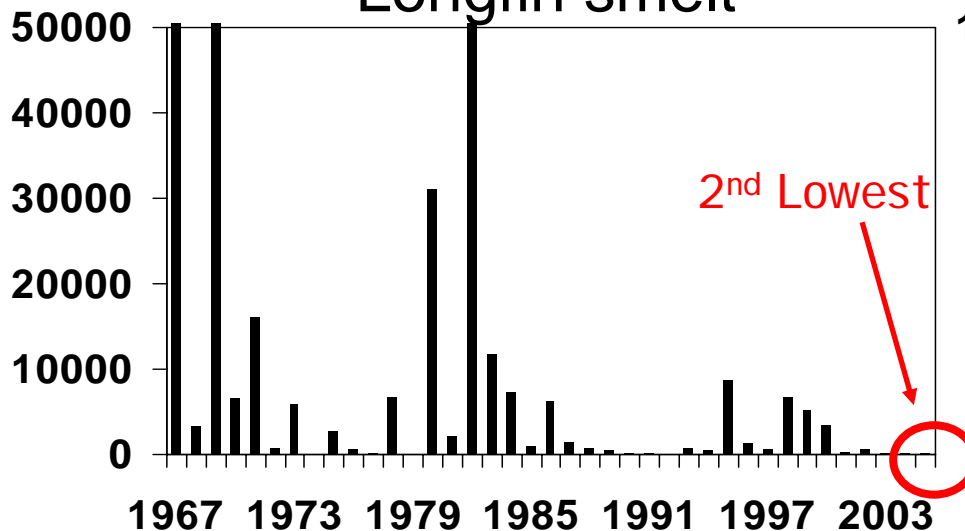
Delta smelt



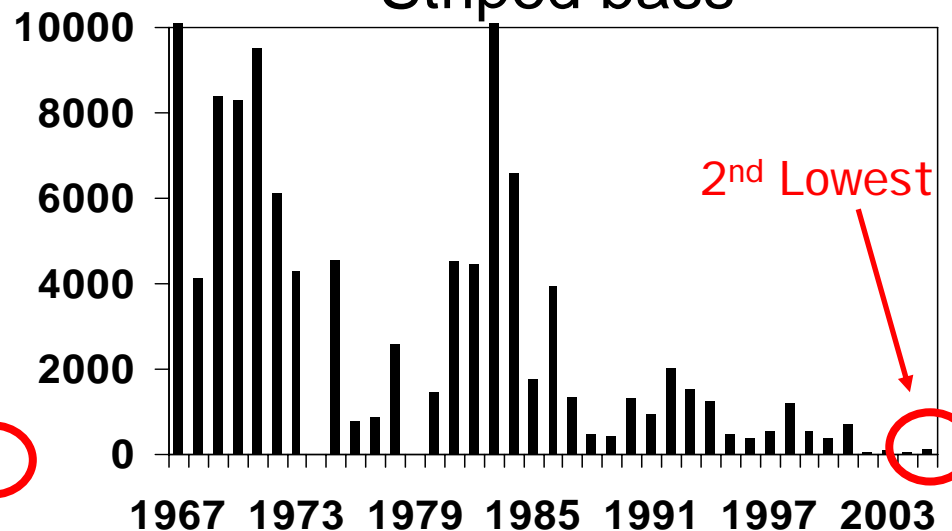
Threadfin shad



Longfin smelt

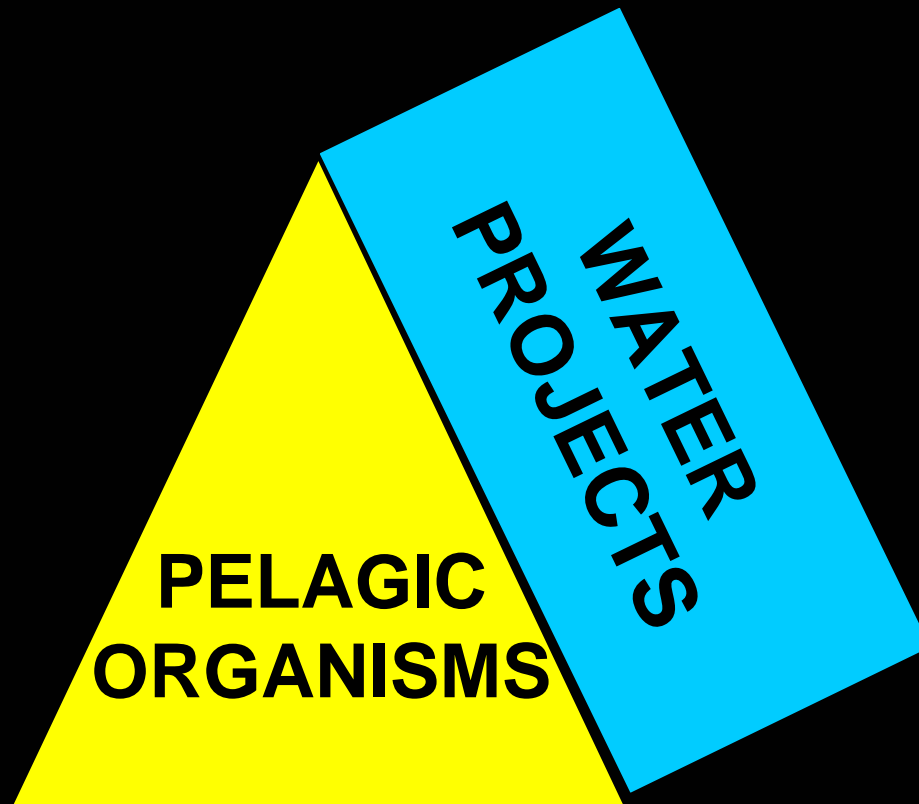


Striped bass



# FACTORS IN THE PELAGIC ORGANISM DECLINE

## 2005 RESULTS





# Water Project Operations: Initial Summary

## *Recent Hydrology and Operations*

Less San Joaquin River flow

Shift in timing of exports

Longer duration of barrier operations

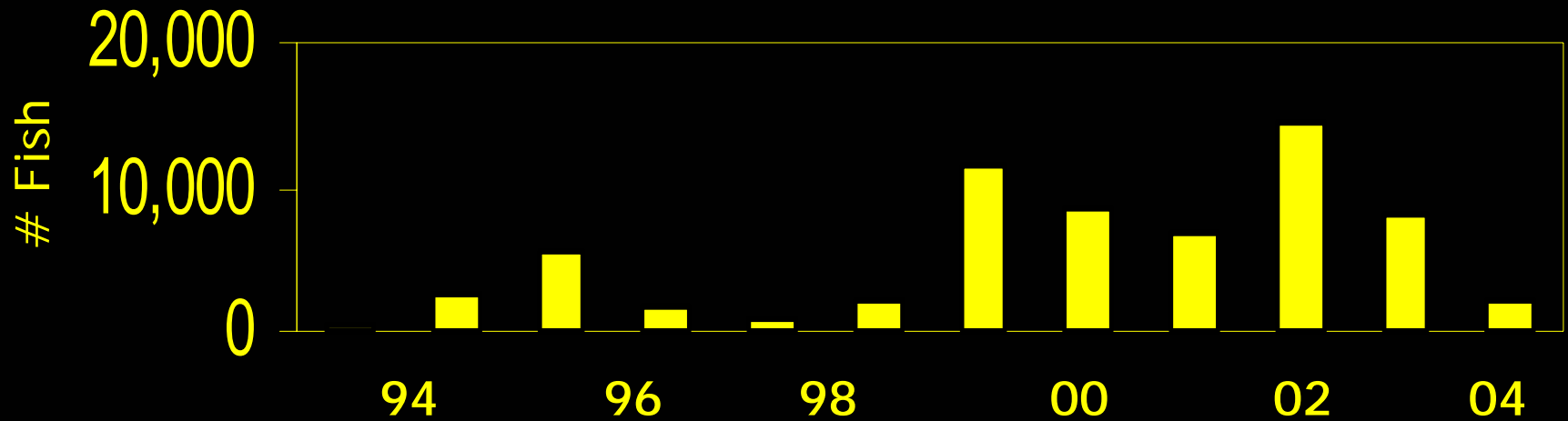


Effects?

# Trends in Fish Salvage



# Winter Salvage of Delta Smelt



Recent higher levels at State and Federal  
Water Projects

# The Winter Salvage Hypothesis

*Recent Hydrology and Operations*

Less SJR River flow

Shift in timing of exports

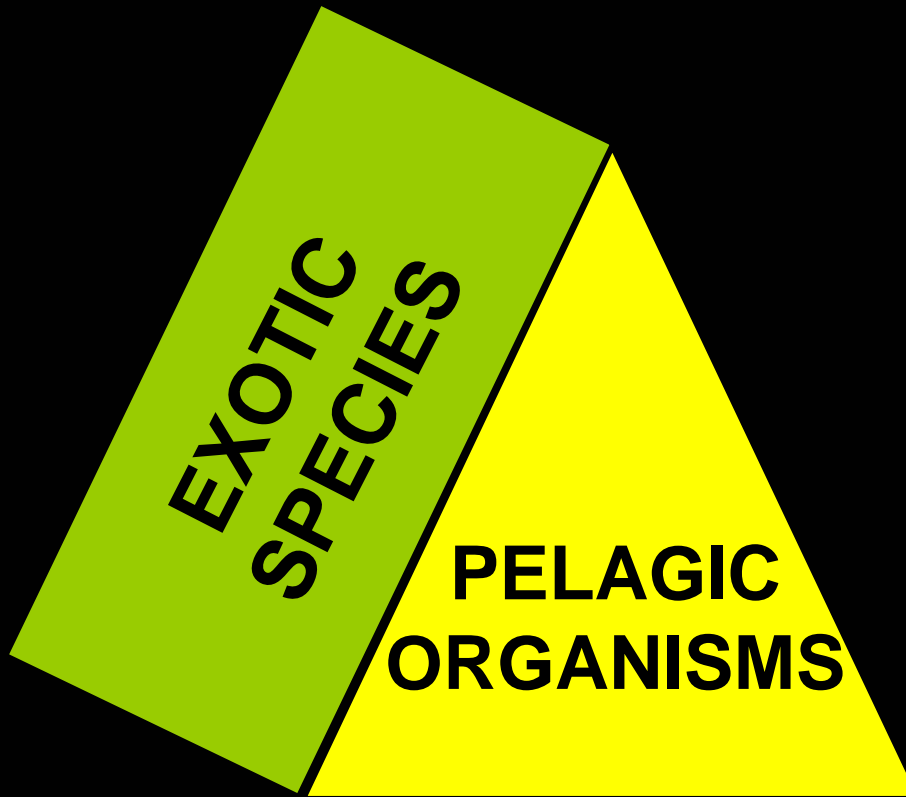


*Entrainment*

Increase in winter salvage.

# **FACTORS IN THE PELAGIC ORGANISM DECLINE**

## **2005 RESULTS**



# “Bad Suisun Bay” Hypothesis

## Recent Trends

Expansion in the range of the clam  
Corbula

Food web  
disruption

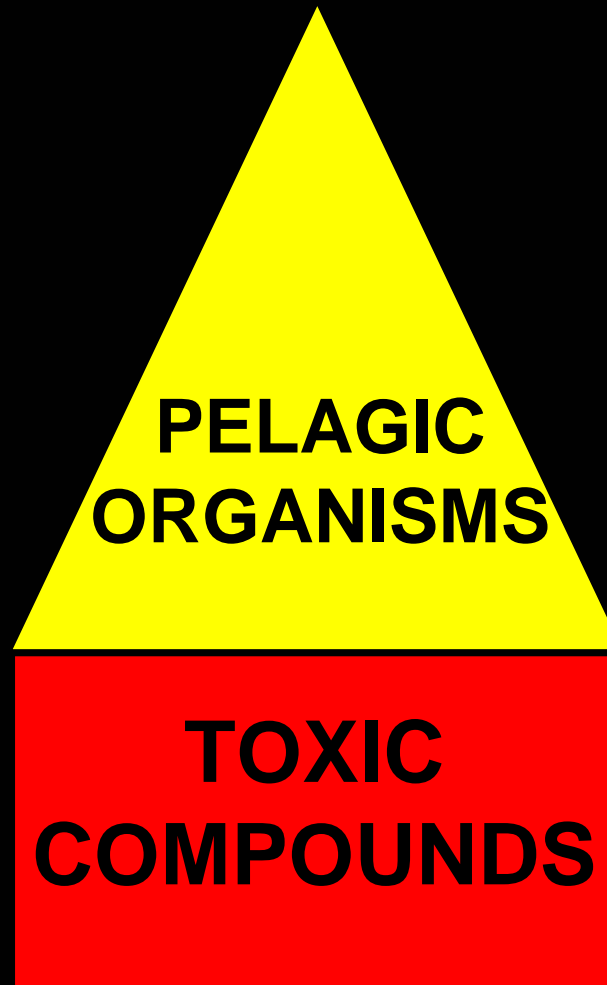
Consistent with BJ Miller  
Analyses






Decline in zooplankton  
(calanoid copepods) in  
Suisun Bay

# **FACTORS IN THE PELAGIC ORGANISM DECLINE**

## **2005 RESULTS**



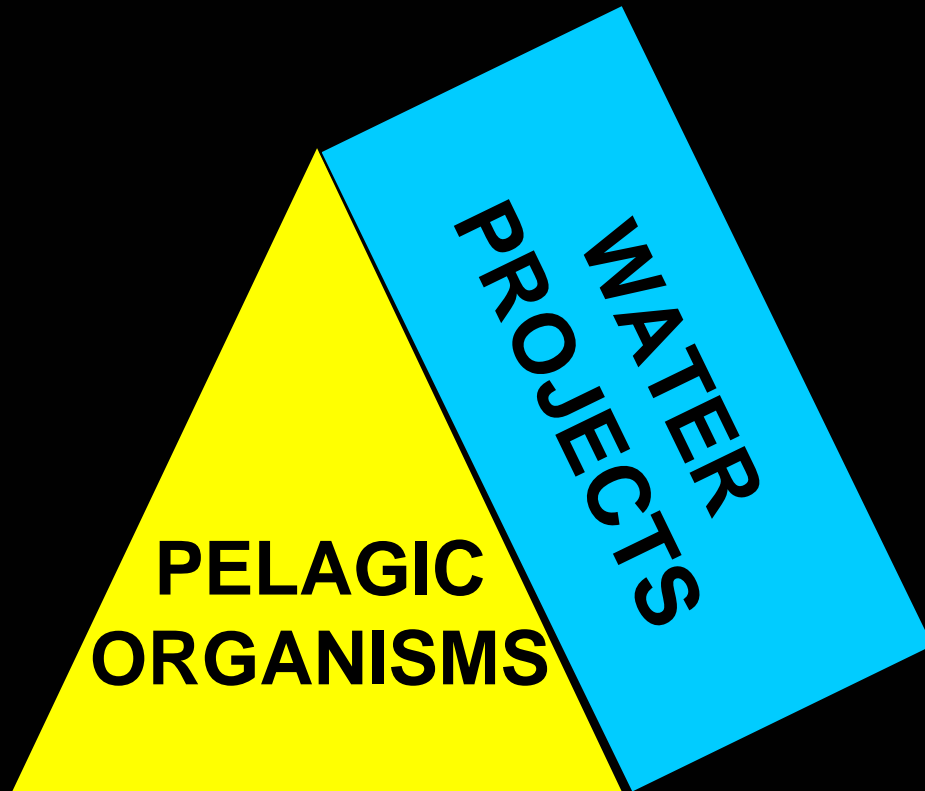
# Toxic Effects: 2005 Study Highlights

-  Changes in the patterns of use for herbicides and pesticides, but it is unclear if these changes pose serious risks.
-  Significant toxicity in some bioassays for 40 percent of sampling sites; however, the cause was not identified.
-  Toxic blue-green alga (Microcystis) was present throughout the Delta at substantially higher levels in 2005 than 2004



# FACTORS IN THE PELAGIC ORGANISM DECLINE

*May 2006 Update*



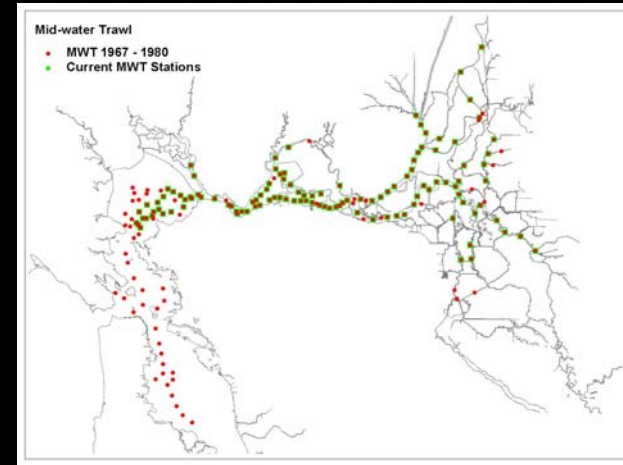
# *What factors were correlated with the step changes in abundance?*

Bryan Manly and Mike Chotkowski

- Analyses of fall fish trawl data.
- Gross hydrology (inflow – exports) has a statistically significant but minor effect on the step changes in abundance.

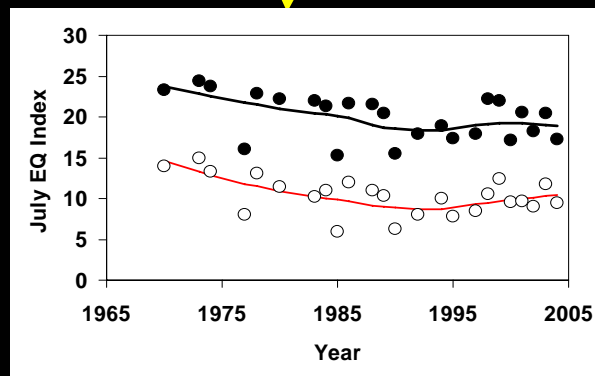
# Trends in Fish Habitat

Model of fish  
habitat “needs” using  
water quality data



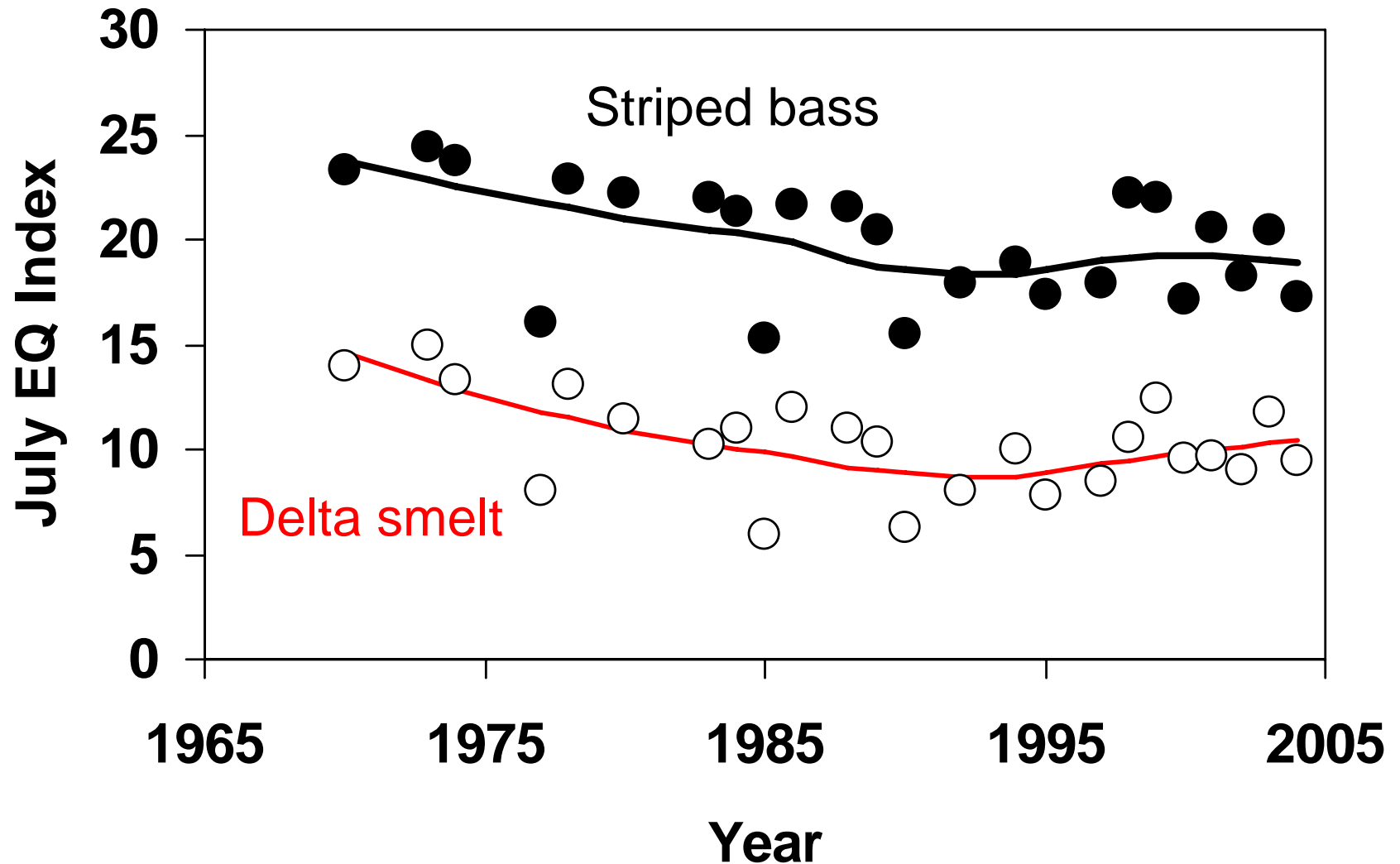
Combine  
information

Long-term water  
quality data for  
estuary

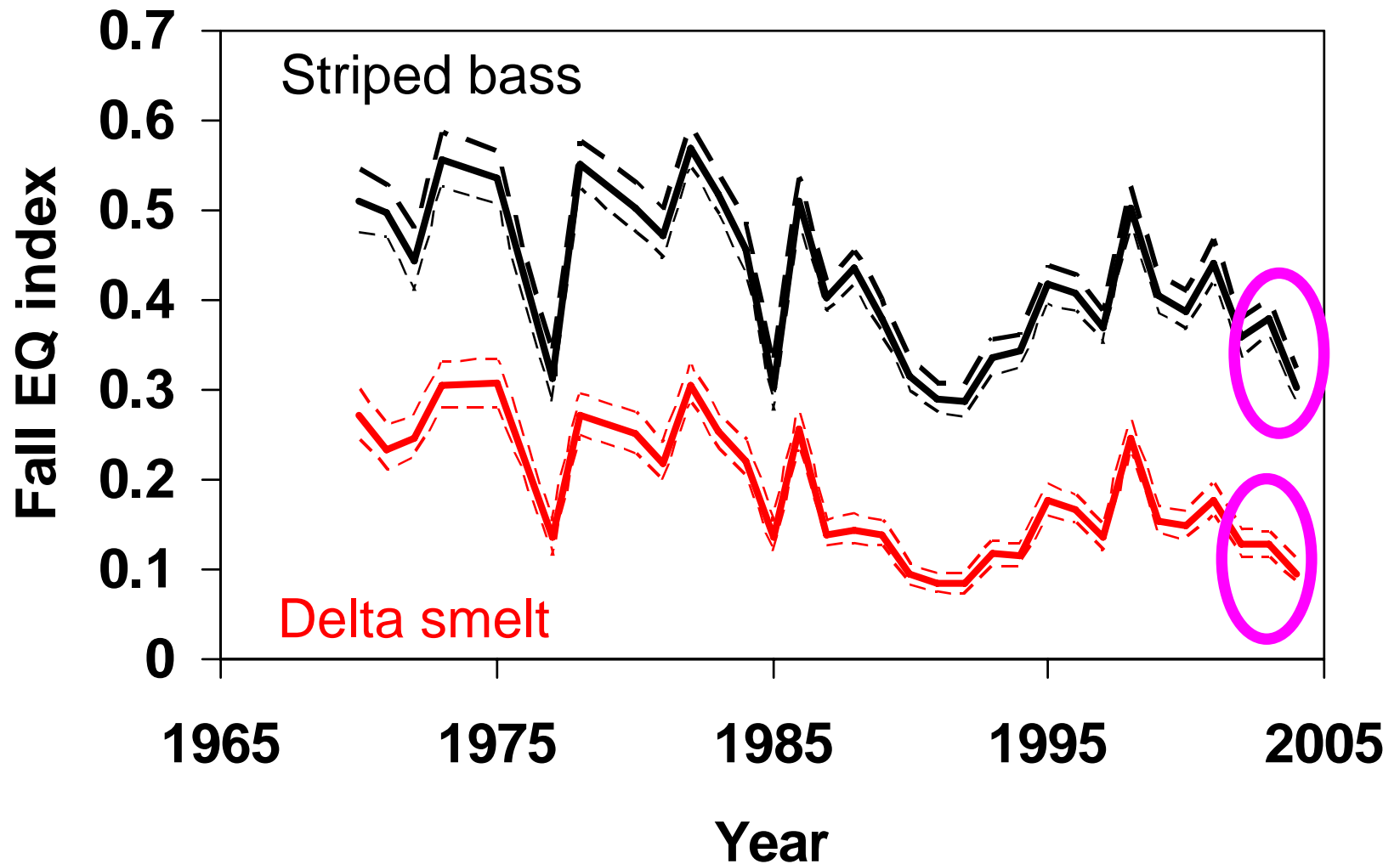


Trends in Environmental Quality (EQ)

# Summer “habitat quality” has deteriorated



# Fall “habitat quality” has deteriorated too



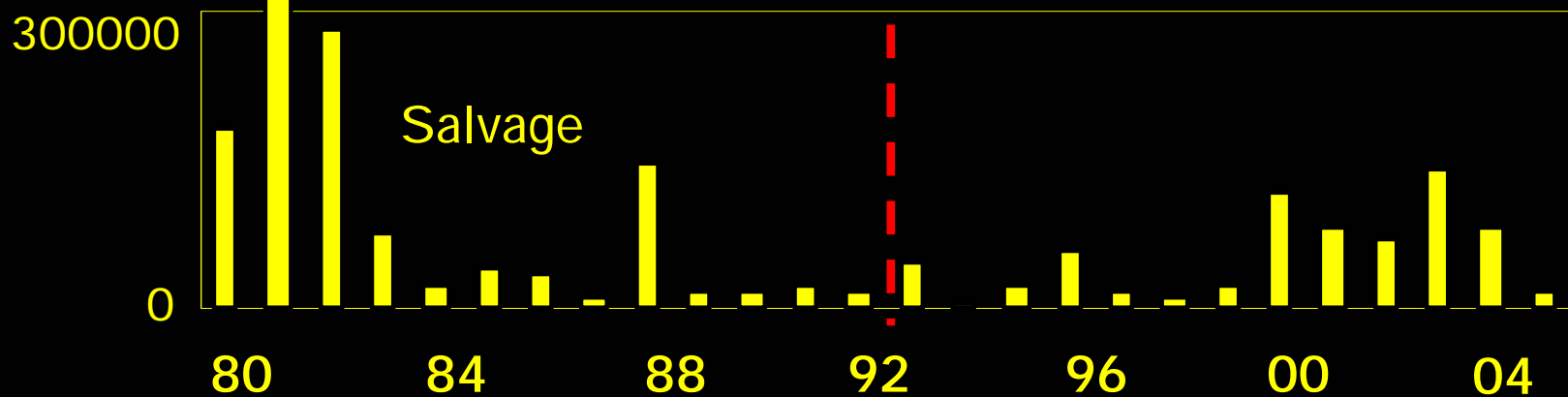
Consistent with Contra Costa Water District analyses

# Has there been a recent decrease in Delta residence time?

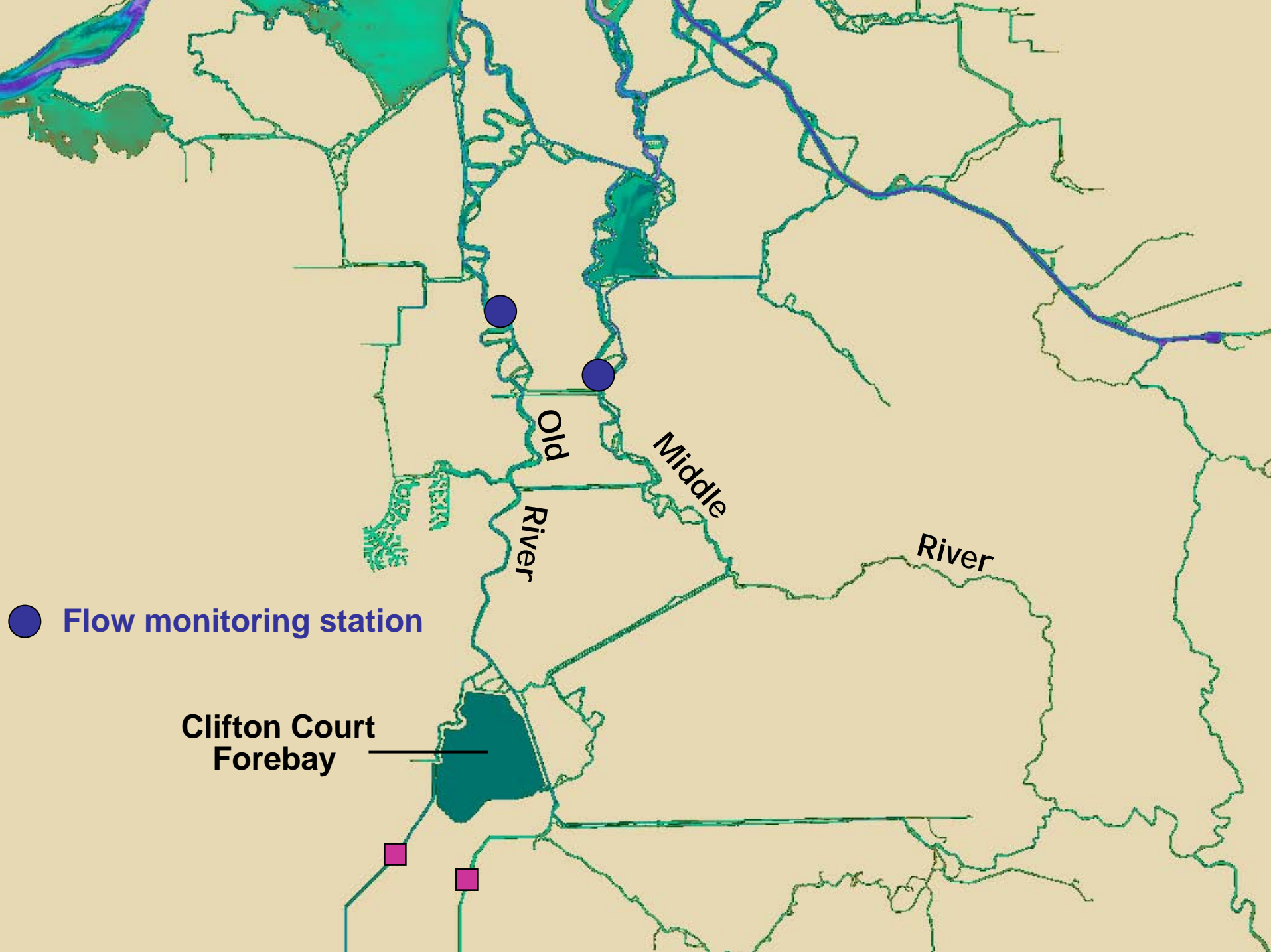
- Longer residence time is important for food web species
- Trends evaluated by DWR using a particle tracking model.
- No evidence of recent changes for Sacramento or San Joaquin rivers.



# Winter Salvage of Delta Smelt (Nov-Mar)



Recent high salvage levels are not unique

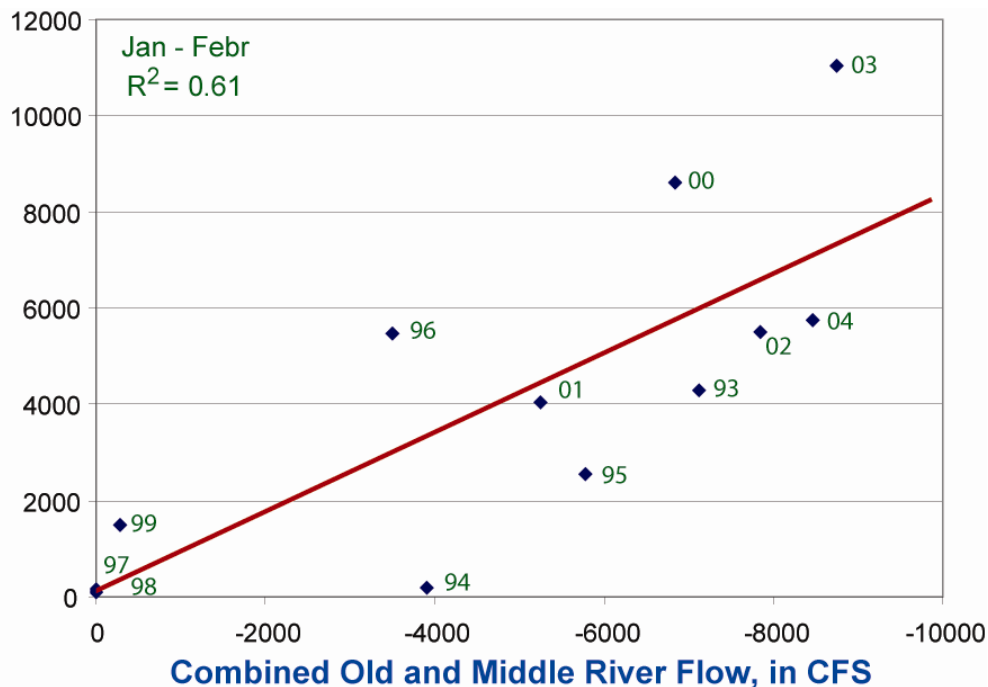




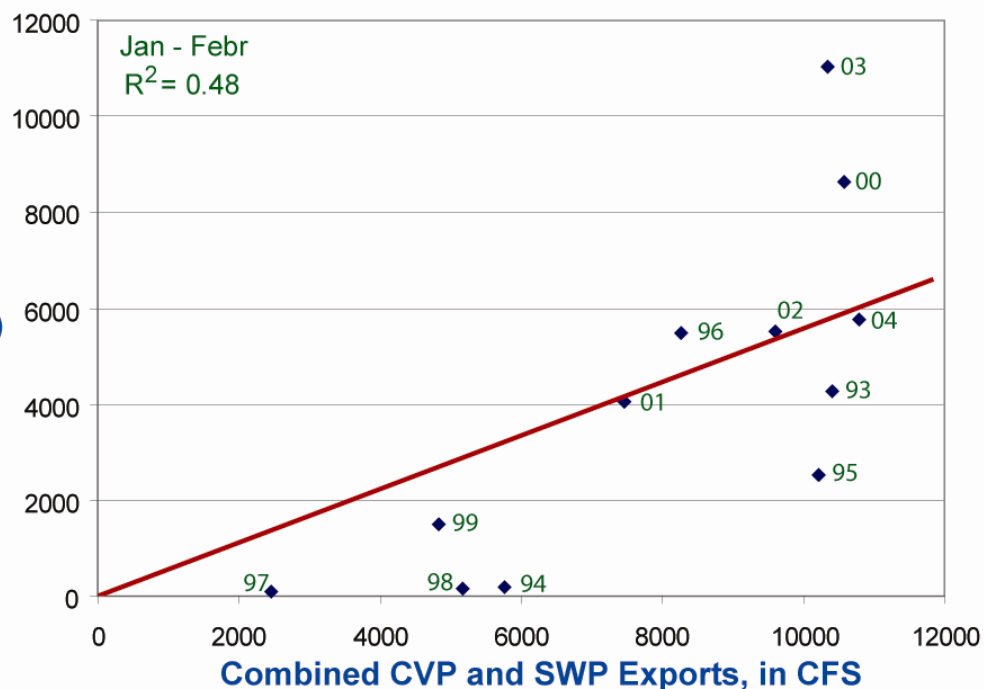
# Flows at Old and Middle Rivers Predict Winter Salvage Levels of Delta Smelt

Source:  
Pete Smith and  
Cathy Ruhl  
(USGS)

Salvaged  
Fish  
(CVP+SWP)



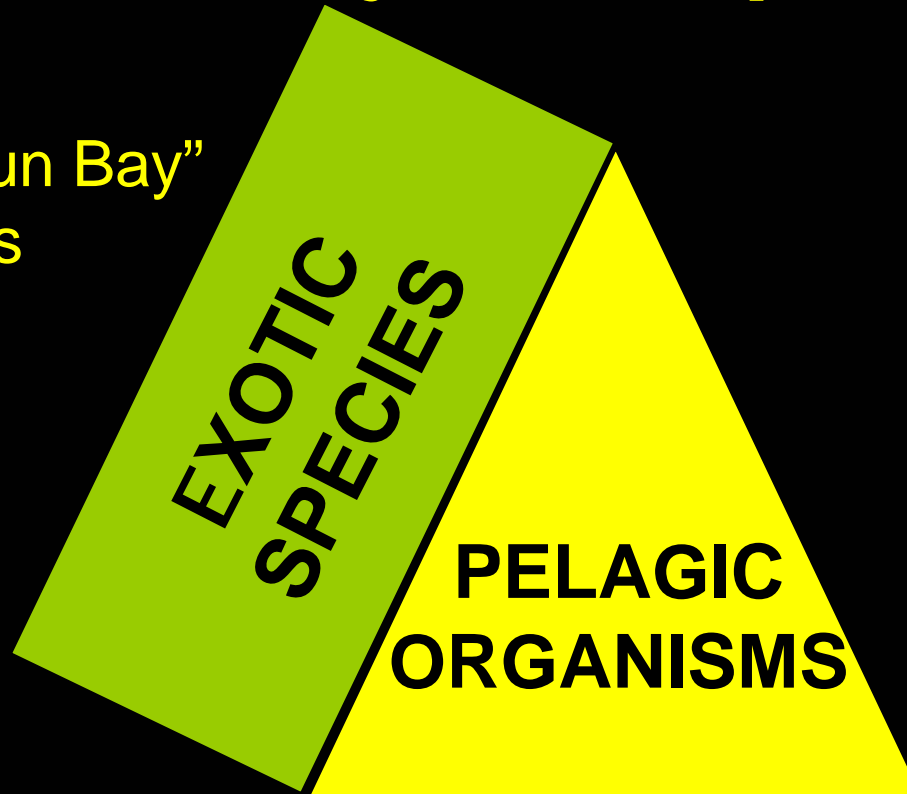
Salvaged  
Fish  
(CVP+SWP)



# FACTORS IN THE PELAGIC ORGANISM DECLINE

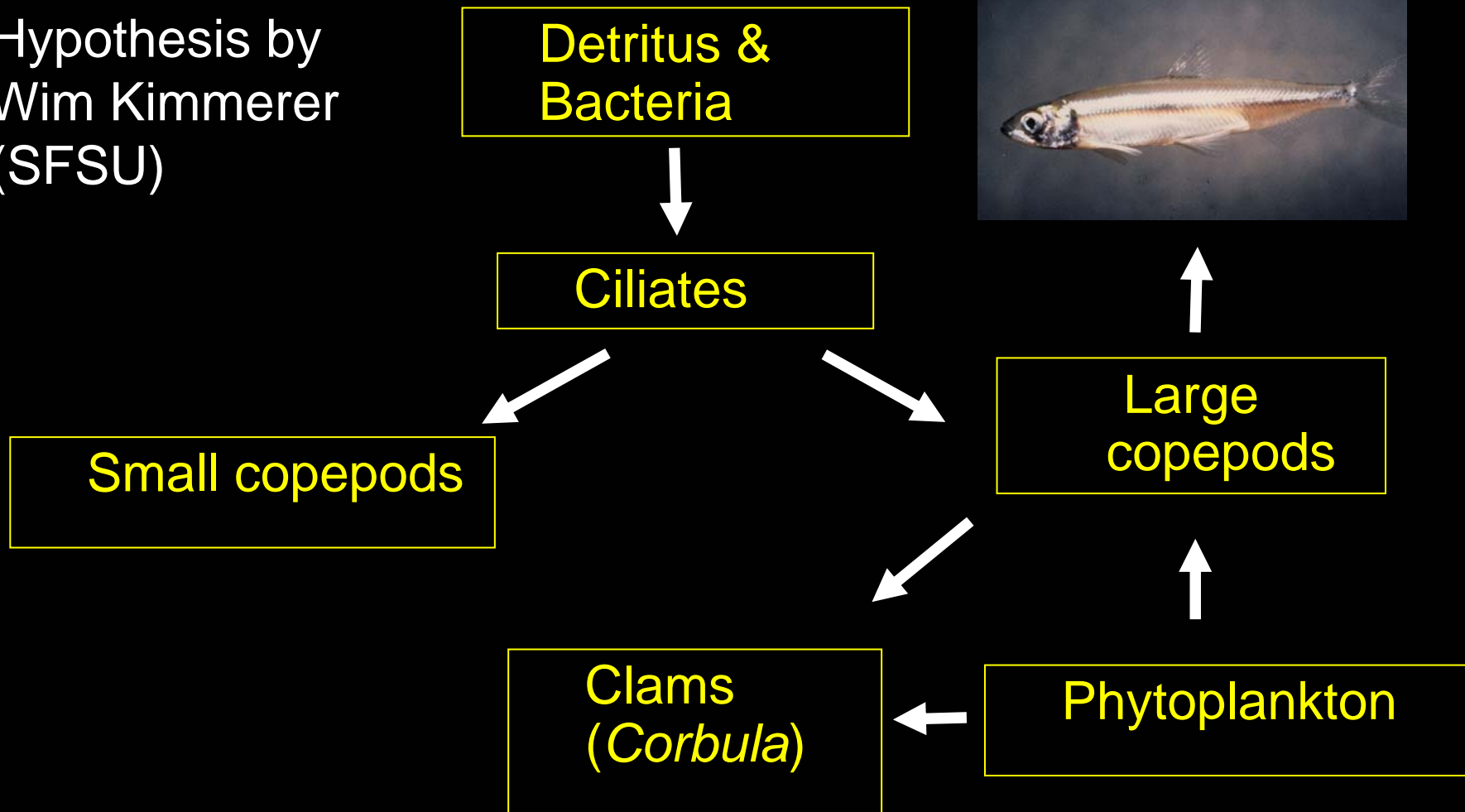
*May 2006 Update*

“Bad Suisun Bay”  
Hypothesis



# Changes in the Suisun Bay Food Web

Hypothesis by  
Wim Kimmerer  
(SFSU)

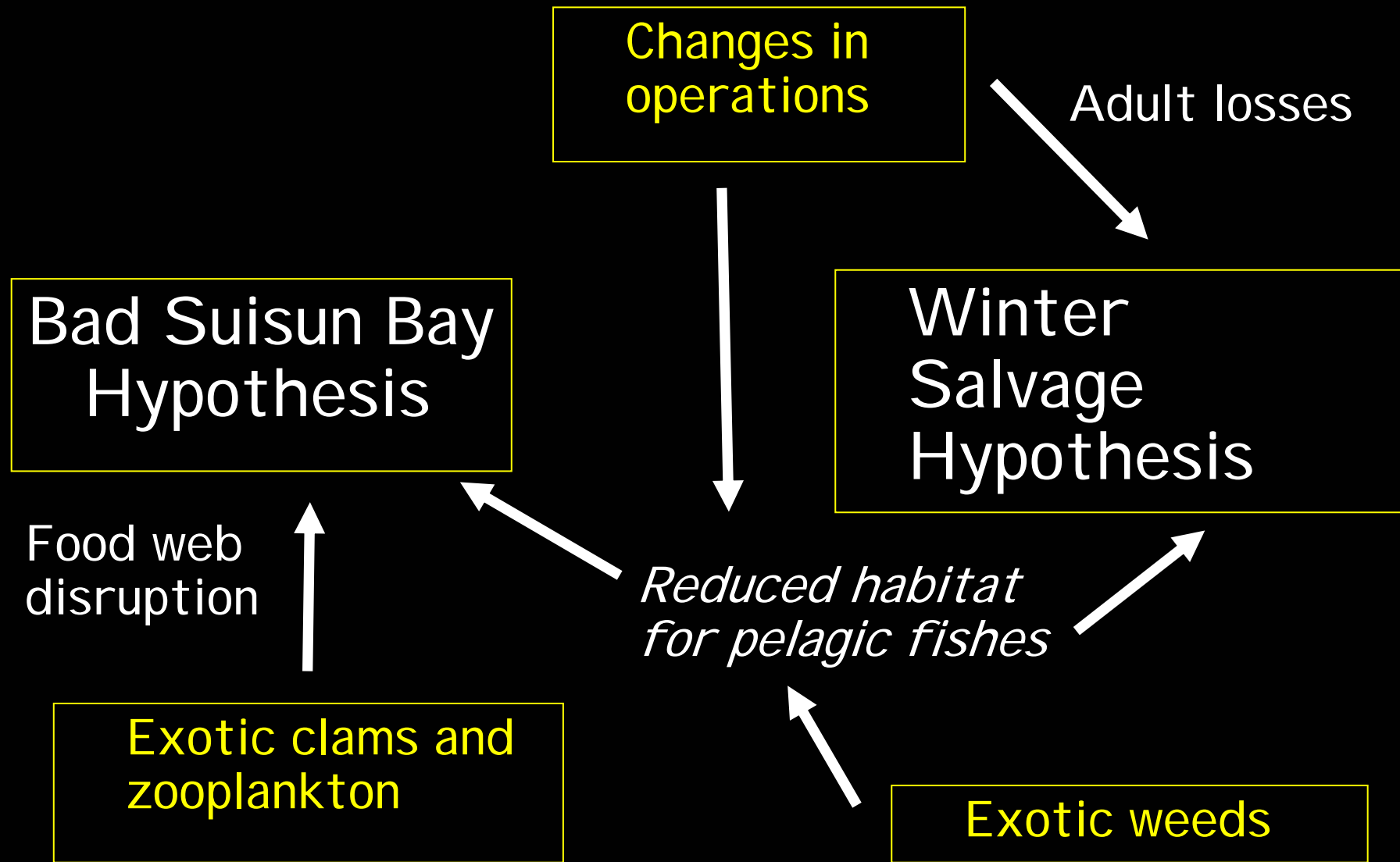


Recent

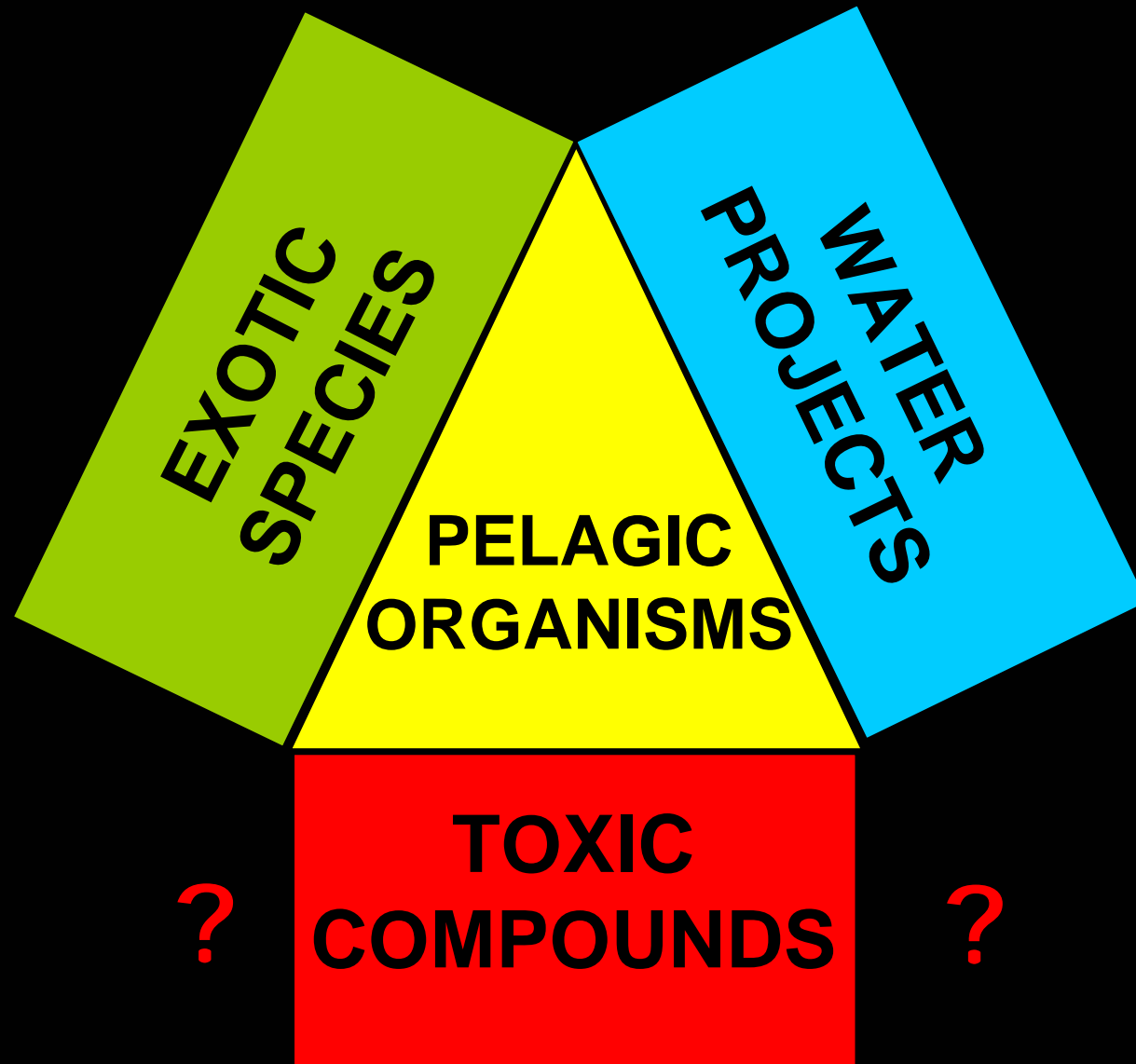
1980s

1970s

# New Linkages Between Hypotheses?



# FACTORS IN THE PELAGIC ORGANISM DECLINE



# 2006-2007 Studies CONTAMINANTS

*Is the water toxic?*

Bioassays on water samples  
(UCD)



*What is the cause of the toxicity?*

Toxicity evaluation –TIE (UCD)



*What are the sources and population  
level effects of toxicity?*

# 2006-2007 Studies: Sources and Effects of Toxicity

*Do wild fish show toxicity  
problems?*

Histopathology & biomarker  
analysis (UCD)

*Role of toxic algae?*  
Microcystis studies  
(DWR/UCD)

*Contaminant sources?*  
Regional monitoring data  
& modeling  
(SFEI et al.)

*Population level  
effects?*  
Dose response modeling  
(UCD)

# Additional Highlights of 2006-2007 Work Plan



## Narratives

- Bad Suisun Bay*
- Winter Salvage*
- Other hypotheses and linkages



## Food web effects

- Phytoplankton (UCD)
- Zooplankton (SFSU, BJ Miller)
- Benthos (DWR, SFSU)



## Fish diseases (USFWS, UCD)



## Power plant effects (Mirant, IEP, SWC)



## Modeling

- Abundance vs. environmental conditions (Manly, USBR, DWR, CCWD)
- Fish population models (SFSU, UCD)
- Particle tracking (DWR)



## Ongoing syntheses (IEP, outside groups)